

Shiqi Lei

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EDUCATION

Department of Mathematical Sciences, Tsinghua University, Beijing, China Aug 2018 – Jun 2022
Bachelor of Science in Mathematics and Applied Mathematics, **Cumulative GPA:** 3.58/4.0
Institute of Automation, Chinese Academy of Sciences, Beijing, China Aug 2022 – Present
Master of Engineering in Artificial Intelligence, **Cumulative GPA:** 3.94/4.0
Core Courses: The Design and Analysis of Computer Algorithm (4.0), Advanced Probability (4.0), Functional Analysis I (4.0), Principle and Algorithms of Artificial Intelligence (3.9)

RESEARCH EXPERIENCES

Unsupervised Real-World Image Denoising Jun 2020 – Aug 2021
Computer Vision | Research Assistant
Advisor: Chenglong Bao, Assistant Professor at Yau Mathematical Sciences Center, Tsinghua University
➤ Proposed a novel method used on unsupervised real-world image denoising.
➤ Designed a different neural network structure to modify the algorithm NN+BM3D proposed by Di Han Zheng and Prof. Bao, combining DNNs with MAP approaches.
➤ The proposed algorithm can achieve 0.1 improvement on average in peak signal-to-noise ratio (PSNR).
AI Human Illusion Replication Jul 2020 – Aug 2020
Neuromorphic Engineering | Participant
Advisor: Cornelia Fermüller, Professor at Univ. of Maryland & Hui Ji, Associate Professor at NUS
➤ Completed the challenge of replicating human illusions when seeing optical illusion images successfully, using optic flow method with neural networks, during Telluride Neuromorphic Cognition Engineering Workshop. [[website](#)]
➤ Tuned the parameters of our model (FlowNet with modification), and designed multiple illusion patterns to demonstrate the effectiveness of the model.
➤ Designed a metric (derived from cosine similarity of optic flow) to measure the illusion intensity of a certain pattern.
High Definition Cryo-EM 3D Reconstruction Dec 2020 – Aug 2021
3D Reconstruction | Research Assistant
Advisor: Mingxu Hu, Researcher at Beijing Advanced Innovation Center for Structural Biology, Tsinghua University
➤ Given projection images on different angles of a protein, we want to reconstruct its 3D structure. The projection angles are unknown, and the existing method can only provide rough estimation. In order to get a fine-grained 3D model, finer projection angle is needed.
➤ Developed optimization algorithms on manifolds ($SO(3)$, the special orthogonal group) instead of Euclidean space, in order to derive locally finer projection angles.

AWARDS

➤ Scholarship of Tsinghua Xuetang Talents Program (Mathematics) Nov 2020
➤ Second prize in China Undergraduate Mathematical Contest in Modeling Oct 2019
➤ Third prize in Tsinghua AI Challenge competition May 2019

SKILLS

Programming Languages: C/C++, Python
Standard English Tests: TOEFL: Total 104 (Reading 29, Listening 30, Speaking 21, Writing 24)
Others: Game theory, Reinforcement learning, Japanese, Pytorch, L^AT_EX